THE BILL BLACKWOOD

LAW ENFORCEMENT MANAGEMENT INSTITUTE OF TEXAS

THE USE OF MOBILE DATA TERMINALS IN LAW ENFORCEMENT

A POLICY RESEARCH PROJECT
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by

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ABSTRACT

Communications is a vital part of each of our daily lives, but it is especially important in the area of law enforcement.. Multitudes of information are transferred between data bases and officers on a routine basis. This information is usually of an urgent nature and its correctness is of extreme importance to all officers.

A new method of communication/information transfer that has been developed within the past few years is the use of mobile data terminals. This research project attempts to study these MDT's and determine their usefulness, advantages and disadvantages.

This study consists of researching books, periodicals, technical publications and the evaluations of other law enforcement agencies. Pricing information is also obtained based on current product availability.

After thorough research and review, this researcher has concluded that MDT's are an extremely valuable tool for the law enforcement professional and that they can provide many benefits to their users. However, the initial cost of this equipment, the monthly recurring costs and the availability of local services may deter or delay the implementation of the use of MDT's in many agencies, especially the smaller, rural agencies.

Nevertheless, it is the opinion of this researcher that all agencies should make attempts at obtaining and using this equipment as soon as possible, as the improved efficiency and and effectiveness of the law enforcement professional will be tremendous.

TABLE OF CONTENTS

INTRODUCTION

The policy research project entitled "The Use of Mobile Data Terminals in Law Enforcement" is a paper designed to investigate the use of mobile data terminals in police departments and to determine the feasibility of such usage as well as determining the possible benefits for the City of Weimar, Texas and the Weimar Police Department.

This project will review the history of the use of mobile data terminals and will provide information on the current usage of such. It will also review the advancements in technology which have improved these communication devices and will evaluate the current models available to law enforcement agencies. Current pricing of these systems will also be included.

Books, periodicals, technical publications and evaluations of other law enforcement agencies will be reviewed to provide the latest and most up to date information as well as a thorough evaluation of these products.

Since their introduction, law enforcement officials have seen advantages in the use of mobile data terminals, but only very large departments have had the time and the funds necessary to fully investigate them. This project will provide management of these smaller agencies with the information they will need to properly evaluate these systems including the advantages, disadvantages and costs. These systems can be provided in various different formats, some of which contain more capabilities than the average law enforcement agency would desire, but this project will evaluate these options and will attempt to provide a basic system which will serve the needs of the vast majority of the agencies. It will also provide information on the additional capabilities and corresponding costs. Further, it is imperative that whatever system and functions are purchased be compatible with other agencies and that the system be designed in such a manner that it will maintain its functionality and feasibility for many years to come.

This project will provide a reasonable and cost effective plan for the addition of mobile data terminals to

the fleets of most all law enforcement agencies based on certain requirements, which will also be fully discussed. It will provide a basis for the implementation of the usage of mobile data terminals in law enforcement agencies and a basis for the development of policies for their usage within these agencies.

Historical, Legal or Theoretical Context

"Law enforcement operates within a mobile environment. In this environment, required tasks are to collect, receive and disseminate information in an effective and efficient manner" (Minarich 1).

As a result of attempts to increase field officer effectiveness, safety and efficiency, manual procedures have been developed which permit field officers to request retrieval of information from the law - enforcement data systems. Generally, the officer verbally requests an inquiry supplying the necessary reference data to the dispatcher, using the voice radio system.

The dispatcher logs the request and either forwards the inquiry for processing by a terminal operator or interrupts his dispatch operation and performs the entry task himself: via a tele-typewriter or data terminal. When the reply is returned, the dispatcher verbally passes the response on to the field officer, via the radio system. Although a typical turnaround time of two to ten seconds is obtained for the computer inquiry/response, several minutes may be required for the dispatcher to receive and copy the inquiry, for the request to be processed and forwarded, and for the reply to be verbally returned to the officer.

This delay, mostly due to human intervention and delays in obtaining use of the radio channel, can cause serious difficulties which affect the efficiency of the entire law-enforcement communications system. For example, during peak activity hours, when data is often most urgently needed, especially in large-city environments, the data base inquiry function may be virtually suspended, because the voice radio system becomes saturated with priority dispatches and other non-inquiry message traffic. In fact, many departments prohibit data base inquiries on the voice channel during busy hours for this reason.

This situation may cause field officers to become reluctant to initiate inquiries, even during non-peak hours. The necessity to reduce congestion on the radio channel and relieve the dispatcher's workload therefore frustrates one of the intents of the data system.

One solution to this dilemma may have been achieved through the development of systems capable of providing field officers with direct access to the law-enforcement data base. Ideally, such systems eliminate delays due to human intervention, by-passing the dispatcher at the base station. By using non-voice data transmission techniques, they also reduce the amount of channel time devoted to data base inquiries.

These systems are called mobile/digital communication systems. The motivation for their development was to provide automated data base access. Other functions, however, which can increase the overall efficiency of law-enforcement operations, can also be performed by these systems (IIT Research Institute 2-3).

“The first communications revolution occurred in 1923 when the City of Detroit. Michigan placed into service the first mobile-radio equipped police vehicle" (Kashey 26). In regards to mobile digital communications, Detroit continued to be a leader. "Detroit's first association with this new mode of communication actually goes back to 1966 when the police department studied the effect of the urban environment on digital radio transmissions" (McKim 24). However, this was just a study. "Digital systems for mobile communications got a start in the 1970's, most through the funding of the Law Enforcement Assistance Administration" (Clede 36).

Even though the digital systems got off to a rather rough start, usage and studies continued to "examine the role of digital transmission techniques for improvement of law enforcement mobile communications, both as regard to operational advantages in command/control and automated information handling, and to more efficient use of the crowded radio spectrum" (Kelly 91).

There are numerous benefits to the use of mobile data terminals and the list of benefits continues to increase, as does usage. "The biggest benefit of such a system is the ability to do a vehicle check in seconds rather than waiting several minutes for traffic to clear. This translates into increased officer safety" (Pilant 31). 'The benefits are really apparent. Motivated street officers who challenge large numbers of persons on the street are frequently stymied in making checks for wants, warrants and steals, especially during hours of peak activity. They often find it necessary to refrain from requesting name checks or registration to insure sufficient air time for routine wants and warrants during busy periods. The vehicle-mounted terminal has resolved this conflict" (Alexander 20).

Security is also a concern in law enforcement and mobile data terminals assist in this area also. "One of the many advantages of the MDT system is the ability to transmit sensitive information digitally, bypassing the general public and criminals who own scanners" (Clark 37).

Another area the MDT system can assist police personnel is in the writing aspect of the job. "Police officers do as much writing, I suspect, as many news reporters, and the portable computers do much to

facilitate report writing. Since most police officers did not choose their work because they wanted to write, they appreciate the help" (Stone 23). MDT's assist the officer in managing this time element better.

Mobile data terminals (and their sisters the laptop computers) are here and are being used throughout the entire law enforcement spectrum. "Our personnel have used MDT's for a number of years to access motor vehicle records and law enforcement data banks themselves, freeing the dispatcher for other duties" (Hart 29).

> They have been used 24 hours a day, seven days a week for the last ten years with some officers arriving as early as two hours before briefing in order to secure a patrol vehicle with and MCT, or waiting for an hour after briefing in hopes that the departing shift will bring m a vehicle with a MCT. They have been abused by neglect, by coffee and coke spills, kicks through the terminal face, and even swept away by floods. But 25 of the original 70 terminals have managed somehow to survive to whet the appetite of officers for this piece of equipment (Moran 19). [NOTE: Moran refers to MDT's as MCT's - mobile computer terminals]

"The mobile digital terminal is a quantum leap m law enforcement technology. It ensures privacy and security, and frees up a tremendous amount of air time over the radio frequencies" (Clark 40). "Laptop computers, mobile data terminals, in-car video cameras, head-up displays - all this technology makes plain old radio dispatch look like something out of the stone age" (Pilant 31).

The researcher feels that the use of mobile data terminals m law enforcement has had a number of advantages for those agencies which have been fortunate enough to use them. These benefits include: the direct written communication (eliminating possibility of misunderstanding due to problems with voice transmissions), the reduction of redundancy in paperwork by the officer being able to enter reports directly from his MDT, the time savings generated by this elimination of paperwork and the more efficient use of officers time, and the increase in productivity and basic law enforcement allowing the officer more time m the field, less time writing reports and the ability to obtain large amounts of information directly to his MDT m a very short period of time.

Review of Literature or Practice

Problems with communication have been around as long as there have been people with which to

communicate. However, in law enforcement, there are specific problems which are continually being addressed. "The most widely known are: Frequency congestion - too many transmitters assigned to the same frequency; Frequency saturation - the degree of available radio frequencies in the electromagnetic spectrum; and Dead spots - geographic areas in which incoming signals are distorted or not received" (Kashey 26).

In an attempt to eliminate some or all of these problems, research and surveys have been done to determine what, if any, equipment may be available. The ability to perform a number of tasks is also of great importance and is included in this research. One such survey desired the implementation of a mechanism that would have the ability to do all of the following:

1. Collect data, *in a secure environment,* in a format that can be utilized by all offices in the County without the necessity of redundant manual processing or data entry to obtain a usable product.

2. Dissemination of data collected electronically to agencies or persons requiring the data.

3. Effectively and efficiently insure quality of product and reduce the number of rejected reports and delays in reporting due to incorrect or incomplete information (Minarich 2).

They also wanted this mechanism to increase productivity. This was to be accomplished by the following:

1. Eliminating redundant preparation of offense, incident and accident reports.

2. Eliminating backlog of offense reports rejected for incorrect information.

3. Reducing current costs in human resources required to process reports.

4. Reducing impact on victims of crime by improving efficiency of information collection and dissemination from the time a crime is reported until the investigation and/or arrest is started.

5. Enabling immediate investigation by having all reports on-line in a central computer within twenty fours after watch end or sooner.

6. Reducing the time taken to process prisoners by submitting arrest information to the Magistrate's office directly from the Mobile Computer Terminal (Minarich 3).

With the proposed implementation of this mechanism, the County hoped for certain results:

1. Increase the quality of reports;

2. Enhance training capabilities;

3. Decrease liability to Bexar County;

4. Decrease the time from receipt of the offense report to initiation of investigation; and

5. Reduce processing time of each call for service and increasing patrol availability (Minarich 3).

Reports of agencies utilizing some type of mobile data terminals or portable computers seem to have similar responses. "In a recent in-house survey of the reactions of 150 patrol officers, 90 percent reported that the computers had reduced the time it takes to write reports, and 94 percent thought the computers had made their report writing easier" (Stone 23). "Hedgepeth says that on one occasion when the communication lines were down, none of the officers wanted to go out on patrol. They have responded very favorably to the MDT's and now take them for granted" (McMillan 33).

The Los Angeles Police Department, Emergency Control System Project provides a very extensive and detailed list of system requirements for mobile digital terminals. Of course, not all of these requirements would be necessary for every agency desiring the implementation of mobile digital terminals, but it can serve as a checklist for review of the requirements any particular agency may deem necessary for their operation (for a detailed description of these items, see Appendix A).

Most of the equipment on the market today incorporates many of these more popular and almost essential features. This list can serve as a guide however and further explanation of these features and characteristic can be found in the Los Angeles Police Department report on phase one of their digital implementation project (Los Angeles Police Department 4-1).

Some of the best advice reviewed for this project came from a Chief who had struggled with the implementation of mobile data terminals and other computerization when he said, "Develop and educate your people, then allow them to grow with the system" (Montgomery 35). After all, it is the officers and support staff that are going to have to use this equipment and will ultimately be the cause of the success or

failure of the program and its implementation.

Communications technology predictions for the future include "instant contact by business people of their home office at all times. In 2030, they will be served by a vast computerized network enabling them to talk to any location in the world while driving down the automated highways" (Duvall 78). This "High Capacity Mobile Telephone System" (Duvall 78) uses frequencies in the 900MHz region and is comprised of "a digital computer and high-speed switching network that is connected to the electronic toll equipment in the central office. Both voice and digital signals are used. The mobile unit fits inside the horn button and is voice activated" (Duvall 78).

Can we even begin to imagine what will be necessary for law enforcement communications at that time?

Discussion of Relevant Issues

When MDT's were first introduced in the 1970's, they were large, fragile, bulky and difficult to use. "In recent years, the continuing miniaturization of electronic equipment enabled building small, rugged, self-contained, and easy to use microprocessor-based MDT's" (Clede 36). However, there were still other problems associated with these machines. "...laptops do have some significant weaknesses, including their limited memory and their tendency to intimidate many law enforcement executives" (Birchler 28). Hardware and software contained problems including the screens, which were "originally of poor quality and size ... and were difficult to read ... and some displayed only a limited number of lines or characters" (Birchler 28). "Software was also a problem with some of the early laptop computers, most of which had very limited memory and therefore could handle only a few programs. Additionally, some of the software being used in microcomputers could not be used with laptops" (Birchler 28).

The initial cost of these systems is another matter of concern. "Another problem was the cost of purchasing a computer, which was initially quite high. Faced with the loss of some federal funds and the drying up of other sources of revenue, many departments' budgets were strained by the purchase of microcomputers, and laptops were often completely out of the question" (Birchler 28).

And finally, "Laptop computers also suffered from the persistence of a stereotype left over from the mainframe era: that it took special, trained programmers to install, operate and maintain a computer system" (Birchler 28).

Despite the problems and concerns, many of which have been solved, eliminated and/or reduced, there are tremendous benefits and advantages which push the acceptance and usage of mobile data terminals and laptop computers.

For a small agency the financial consideration would include budgeting and maintenance of a computerized system. Future savings would be evident. "In a small police department ... with its small fleet ... and 11 sworn officers, laptop computers have won a battle in the war against paperwork" (Mclean 22). "...the department is saving at least $20,000 per year by cutting down on clerk-typist time" (Mclean 22).

Gains in effectiveness and efficiency are fairly easy to identify with the implementation of mobile data terminals - "increased productivity - reduced radio traffic - fewer errors associated with human communication - increased communication security - improved officer safety - increased communication range" (Patterson 23). "The biggest benefit of such a system is its ability to do a vehicle check in seconds rather than waiting several minutes for radio traffic to clear. This translates into increased officer safety" (Pilant 31).

Basic laptop computers have also received their share of praise. "Officers felt comfortable with the laptops and so did their supervisors. Reports were easier to read, errors could be corrected more smoothly, and data could be added or removed easily. As a result, accuracy and completeness had improved" (parker 57).

Even with all these benefits and praise, there are still some other problems which need to be considered. "Although MDT's are getting smaller, ...there are departments that cannot afford such streamlined versions" (Pilant 48), as costs are often adversely proportionate to the size of the equipment. Another

problem that needs to be addressed is the increase in traffic. Estimates are that the “traffic will increase approximately 20 times" (Pilant 48). Departments will need to make sure that their computer system will be able" to handle the extra work officers will give it" (Pilant 48).

With all the improvements in mobile data terminals, and all of the benefits they can provide, the only major factor still to be overcome is the cost. Costs of MDT's vary dramatically, based on the functions desired and the type of system being implemented. However, each agency will need to weigh the costs against the expected benefits that can be derived from the system. There are basically three methods for obtaining funding for the purchase of MDT's. One of these methods and the source which should be approached first is that of "Criminal Justice Funding" (Smith 41).

Another source would of course be "Local Funding: Individual Projects" (Smith 41). This would be the sole responsibility of a single jurisdiction and would involve not only the funding, but also the implementation of the system. A final source of funding would be "Local Funding: Group Projects" (Smith 41). This is probably the most difficult of the three methods, but it is also probably the best alternative for most jurisdictions. This approach would involve a number of jurisdictions that would not only work together to raise the funds for the system, but they would also have to work together in the design, installation and implementation of the system, as well as its operation, maintenance, review and possible upgrade. Needless, this relationship may create new problems, but with the proper organization and treatment of all the jurisdictions involved, this method can prove extremely beneficial for all involved.

Conclusion/Recommendations

This research project is designed to investigate the use of mobile data terminals in police departments and to determine the feasibility of such usage. It seems to be a consensus of opinion that there are tremendous advantages to the use of mobile data terminals, but the costs of this technology created questions and problems for smaller agencies.

In this report, we have reviewed both the advantages and disadvantages of mobile data terminals and

portable computers. It should be noted that portable computers have been included in this discussion as they are very closely related. Portable computers can be used as mobile data terminals, when they are designed for mobile communications. Thus, mobile data terminals are simply portable computers which have been designed/adapted for mobile communications. However, it is essential that a communications system be established in which these terminals can communicate, or it is like having one walkie-talkie and no one else to talk to; nice equipment, but totally useless.

The advantages of mobile data terminals and their usage are very evident. At first, costs were such that the medium to smaller agencies could not afford them. However, the cost of this equipment, much the same as other computer equipment, has dropped significantly. Thus, cost is no longer the primary factor which would preclude agencies from adding these terminals to their fleet.

The only factor which continues to hamper the smaller agency is the necessity of a system which networks not only the individual agency, but also has the ability to communicate with all other agencies with whom you now may share a communication system and also those with which you will need to send and receive information. These can be factors which may in fact be cost prohibitive at this time if all associated agencies are not able to commit to the project at the same time. A lot of thought, investigating, planning and forethought need to go into the review of the feasibility of a mobile data system for an agency. The requirements checklist and thorough evaluation of an agency's needs are imperative prior to making any decision regarding this system. Further, it can be extremely beneficial to contact other agencies who have implemented a system and solicit their advice. Vendors are also more than anxious to provide you with all sorts of information regarding the systems they represent.

The benefits of the addition of mobile data terminals to the Weimar Police Department would be tremendous. These benefits have been outlined in this report along with the drawbacks. However, it is the conclusion of this researcher that the benefits far outweigh the drawbacks and that every effort should be made to add this important tool to the arsenal of every police officer. Thus, this researcher proposes that

the City of Weimar adopt a plan to work with Colorado County in developing a system which will allow the use of mobile data terminals by all of its officers and that the City of Weimar begin budgeting for the acquisition of the required equipment by the time the operational system is in place. It is also suggested by this researcher that both the City of Weimar and Colorado County review alternative sources of funding (i.e.: grants, especially those available from the Lower Colorado River Authority). Further, this researcher believes that the infrastructure and 900 megahertz radio system designed implemented and operated currently by LCRA could be a very viable solution to provide the type of system necessary for the use of the mobile data terminals for the Weimar Police Department.

"Although the nature of policing often looks like one big computer, it should be clear that the computer is only a tool in an information-intensive business. Processing that information accurately and efficiently can make the difference in officer safety, increased productivity, reduced costs and, ultimately, the ability to clear and successfully prosecute a case" (Pilant 38).

BIBLIOGRAPHY

Alexander, William and George Banks and James Stapnick, "Smart Cars." FBI Law Enforcement Bulletin. April 1978: 16-20.

Birchler, Mark Robert. "The Future of Law Enforcement: Laptop Computers." The Police Chief May 1988: 28-30.

Clark, Charles W. and Diane Maus. "Selection and Installation of a Mobile Digital Communications System." The Police Chief May 1988: 36-40.

Clede, Bill. "Micro-Computers on Patrol." Law and Order September 1986: 36-42.

Duvall, J. Barry and George R Maughan, Jr. and Ernest G. Berger. Getting the Message. Worchester: Davis Publications, Inc., 1981.

Hart, William. "Integrating Today's Technologies in Tomorrow's Emergency Response System." The Police Chief March 1990: 26-27,29-30,32-33.

IIT Research Institute. An Analysis of Selected Vendors' Approaches to Two-Way Mobile Digital Communications. Chicago, IL: TITRI, 1973.

Kashey, D.R "Mobile Digital Terminals - Police Communications of the Future." Law and Order February 1978: 26-38.

Kelly, Thomas C. and James E. Ward. Investigation of Mobile Radio Communications. Cambridge, MA: M.I.T., 1973.

Los Angeles Police Department. Emergency Command Control Communications Systems. Gaithersburg, MD: IACP, 1977.

McKim, W.W. "Detroit (MI) Police Go Mobile Digital." Police Chief October 1979: 24-26.

McLean, Herbert E. "Time in Their Laps." Law and Order February 1989: 22-24.

McMillan, Miller. "High Tech Enters the Field of View." The Police Chief August 1994: 29, 31-34.

Minarich, Madonna. Request for Proposal Equipment Vendors for Patrol Incident Reporting System. San Antonio, TX: Bexar County Sheriff's Office, 1996.

Montgomery, Arthur J. "The Systems Analysis Question." The Police Chief May 1988: 34-38.

Moran, J. In-Car Mobile Terminal Use. Las Vegas, NV: Las Vegas Metropolitan Police Department, 1986.

Parker, Patricia A. "Point & Click." Police September 1994: 56-59

Patterson, R. M., Jr. "Mobile Data: Benefits, Alternatives and the Future." The Police Chief August 1994: 23-26.

Pilant, Lois. "Modernizing Your Communications Unit." The Police Chief June 1992: 39,42-44, 48-50.

Pilant, Lois. "Vehicle-Based Communications." The Police Chief November 1994: 31-32,34 36,38.

Smith, Les. "A Systems Management Approach to Mobile Data Terminals." The Police Chief May 1998: 41-43.

Stone, Brewer S. "The High-Tech Beat in St. Pete." The Police Chief May 1998: 23-24.

Appendix A

Los Angeles Police Department Emergency Control System Project

List of Requirements

A. Address Detector
B. Error Detector/Corrector
C. "ACK" Generator
D. "ACK" Detector
E. Out-of-Unit Control
F. Message at Base Detector
G. Receive Message Buffer
H. Priority Detector
I. Display Control Logic
J. Message Waiting Indicator
K. Display Buffer
L. Auxiliary Message Buffer
M. Message Print of Record Control
N. Clear Display Control
O. Tape Recorder
P. Encoder
Q. Alphanumerics
R. Display
S. Stored Message Memory
T. I.D. Generator
U. Transmit Buffer
V. Retransmit Timer
W. Channel Sense
X. Transmitter Control
y. A VM Receiver

Appendix B

Mobile Data Terminal Pricing

Manufacturer/Supplier	Make/Model	Unit Cost
Hyperdata	KE78L	$1799.
Hyperdata	SF78	2298.
Acer	Extensa 502T	1859.
Acer	Extensa 710TE	2379.
Sager	NP8620	2273.
MCS	Metolious 430M2	2250.
MCS	Roque	2300.
MCS	Siletz 426T	1900.
Toshiba	TSHB 1926	1998.
Toshiba	TSHB 2207	2298.

NOTES:

1) These cost estimates are for the basic MDT/laptop models described - additional costs may be incurred for accessories including, but not limited to: chargers, adapters, cables, installation systems, installation, etc.

2) Hookup and recurring communication charges vary dramatically from one are to another, based on service providers, etc. These charges are also changing very rapidly (for the most part, reducing) as more and more users get on a system. It is thus suggested that various service providers be contacted to determine actual costs and desired services for any particular area.

3) Further, the costs on MDT/laptops are also changing on a daily basis as the prices for older models go down as newer models are introduced. Thus, these estimates should only be used as a very basic guideline.